UTAH GEOLOGICAL SURVEY
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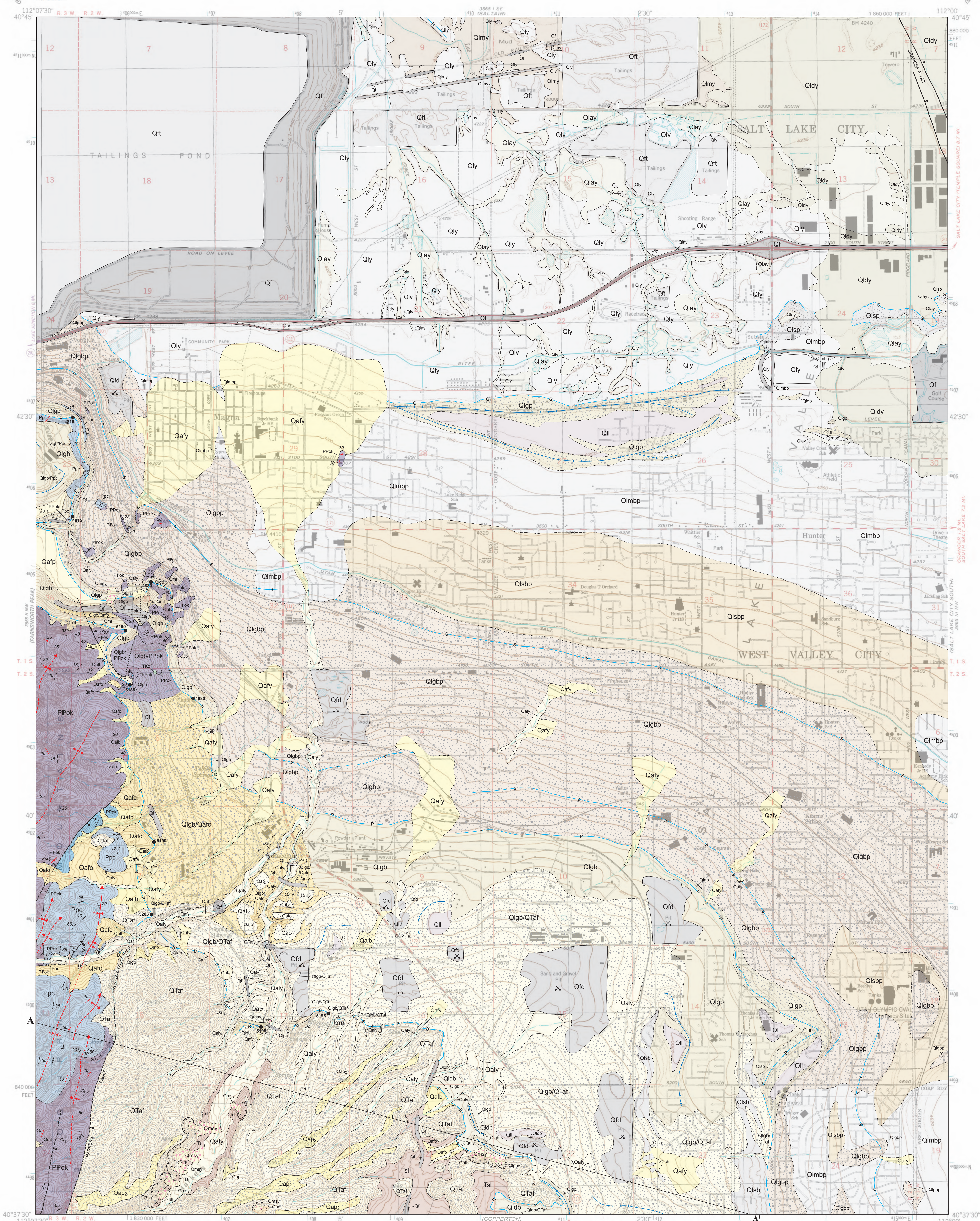
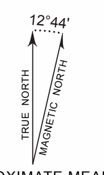
UTAH DEPARTMENT OF NATURAL RESOURCES



Base from U.S. Geological Survey,
Magna 7.5' quadrangle, 1999
North American Datum of 1927

This geologic map was funded by the Utah Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program through USGS STATEMAP award number 03HQAG0096. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.



APPROXIMATE MEAN DECLINATION, 2007

SCALE 1:24,000

1 0.5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
SUPPLEMENTAL CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GEOLOGIC MAP OF THE MAGNA QUADRANGLE
SALT LAKE COUNTY, UTAH

by

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2007

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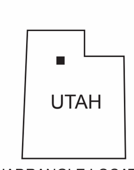

QUADRANGLE LOCATION

Field mapping by authors 2003-2004
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1	2	3
4		5
6	7	8

1. Antelope Island South
2. Baileys Lake
3. Salt Lake City North
4. Farnsworth Peak
5. Salt Lake City South
6. Bingham Canyon
7. Copperton
8. Midvale

ADJOINING 7.5' QUADRANGLE NAMES

DESCRIPTION OF MAP UNITS

QUATERNARY

Alluvial deposits

Qaly — **Young alluvial deposits** (Holocene to upper Pleistocene) – Moderately sorted sand, silt, clay, and pebble to boulder gravel deposited in stream channels and flood plains; includes abandoned flood plains that postdate the Bonneville shoreline of latest Pleistocene Lake Bonneville, which occupied the valley from about 32,000 to 10,000 years ago (Currey and Oviatt, 1985) (table 1); the alluvial deposits are incised by active stream channels, and locally include small alluvial-fan and colluvial deposits; includes modern and older, post-Lake Bonneville stream deposits that are undifferentiated because units are complexly overlapping; probably less than 20 feet (6 m) thick.

Qalb — **Alluvial deposits related to the Bonneville (transgressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Moderately sorted sand, silt, and pebble to boulder gravel deposited by streams graded to shorelines of the transgressive phase of Lake Bonneville; incised by active streams; mapped east of Harkers Canyon; about 20 feet (6 m) thick.

Qat_2 — **Stream-terrace deposits** (upper to middle Pleistocene) – Moderately to well-sorted sand, silt, clay, and pebble to boulder gravel that forms level to gently sloping terraces incised by modern streams; subscript denotes relative height above modern stream channels; level-2 deposits are greater than 30 feet (10 m) above modern drainages and are found at the mouths of Coon and Harkers Canyons in the southwest corner of the Magna quadrangle; lower and younger level 1 (Qat_1) deposits are found in the adjacent Copperton quadrangle (Biek and others, 2006); deposited in stream channels and flood plains; older terraces may include a loess veneer; generally 0 to 20 feet (0-6 m) thick.

Qaf_1 — **Modern alluvial-fan deposits** (Holocene) – Poorly to moderately sorted, weakly to non-stratified, clay- to boulder-size sediment deposited principally by debris flows at the mouths of small, active drainages; upper parts characterized by abundant boulders and debris-flow levies that radiate away from the fan apex; equivalent to the younger part of Qafy but differentiated in Coon Canyon where deposits can be mapped separately; generally less than 30 feet (9 m) thick.

Qafy — **Young alluvial-fan deposits** (Holocene to upper Pleistocene) – Poorly to moderately sorted, weakly to non-stratified, clay- to boulder-size sediment deposited principally by debris flows; generally obscures Lake Bonneville shorelines; equivalent to modern alluvial-fan deposits (Qaf_1) and older, post-Lake Bonneville alluvial-fan deposits that are undifferentiated because units are complexly overlapping or too small to show separately; upper parts of fans are locally deeply incised; mapped near the margins of the Oquirrh Mountains and extending as much as 3 miles (5 km) from the range front where drainages incise Lake Bonneville deposits; probably less than 40 feet (12 m) thick.

Qafp — **Alluvial-fan deposits related to the Provo (regressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Poorly to moderately sorted, clay- to cobble-size sediment deposited principally by debris flows graded to the Provo shoreline; incised by active streams; forms the broad, gently sloping floor of Little Valley above the Provo shoreline in the northwest part of the Magna quadrangle; probably less than about 40 feet (12 m) thick.

Qafb — **Alluvial-fan deposits related to the Bonneville (transgressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Poorly to moderately sorted, clay- to cobble-size sediment deposited principally by debris flows graded to the Bonneville shoreline; incised by active streams; mapped south of Harkers Canyon the unit may locally include topset beds of deltaic deposits related to the transgressive phase of Lake Bonneville (Qldb); probably less than about 40 feet (12 m) thick.

Qafo — **Older alluvial-fan deposits** (upper to middle Pleistocene) – Poorly to moderately sorted, weakly to non-stratified, clay- to boulder-size sediment deposited principally by debris flows; mapped by Slentz (1955) as part of the Pliocene and Pleistocene Harkers Fanglomerate unit of the Salt Lake Group, including all pre-Bonneville alluvial-fan deposits, which was redefined by Tooker and Roberts (1971b) as the Pleistocene Harkers Alluvium; forms deeply dissected alluvial apron near Coon Canyon; exposed deposits are truncated by, and thus predate, the Bonneville shoreline; late to middle Pleistocene age is suggested by development of stage II calcic paleosols on fan surfaces, characterized by calcium-carbonate coatings on clasts in a loose matrix with dispersed calcium carbonate, and stage III calcic paleosols characterized by indurated horizons plugged with calcium carbonate; underlies piedmont slopes below the Bonneville shoreline beneath a thin veneer of lacustrine deposits; may be undifferentiated from underlying middle Pleistocene to upper Miocene[?] alluvial-fan deposits (QTaf) where mapped in deeply incised stream channels; exposed thickness as much as 150 feet (45 m).

Qap_2 — **Pediment-mantle alluvium** (upper to middle Pleistocene) – Poorly to moderately well-sorted sand, silt, clay, and pebble to boulder gravel that forms a thin veneer on gently sloping erosional surfaces; subscript denotes relative height above modern stream channels; level 2 deposits are from 80 to 160 feet (25-50 m) above modern drainages and are found in the Oquirrh Mountains south of Harkers Canyon, overlying middle Pleistocene to upper Miocene[?] alluvial-fan deposits (QTaf); lower and younger level 1 deposits (Qap_1) are mapped in the adjacent Copperton quadrangle (Biek and others, 2006); level 2 pediments in the Oquirrh Mountains are equivalent to both pediment numbers 1 and 2 of Slentz (1955), which are approximately the same age and are undifferentiated on our map; as much as about 15 feet (5 m) thick.

Artificial deposits

Qf — **Artificial fill** (historical) – Engineered fill used in the road construction and railroad embankments crossing drainages in the Oquirrh Mountains foothills, in abandoned railroad grades crossing Great Salt Lake mudflats, in tailings-pond embankments and levees, and in the construction of State Route 201; a large area of similar fill underlies commercial development in the northeast part of the Magna quadrangle, but natural deposits beneath the fill, rather than the fill itself, are mapped from 1958 aerial photographs; unmapped fill may be present in any developed area; the tailings-pond embankment in the northwest corner of the Magna quadrangle is as thick as about 150 feet (50 m), but artificial fill is thinner elsewhere.

Qfd — **Disturbed land** (historical) – Land disturbed by sand, gravel, and aggregate operations, as well as a disposal site for debris from a railroad cut southwest of Magna; only the larger operations are mapped and their outlines are based on aerial photographs taken in July and October 1997; land within these areas contains a complex, rapidly changing mix of cuts and fills; most operations along the Oquirrh Mountains range front east and south of Harkers Canyon are extracting material from middle Pleistocene to upper Miocene[?] alluvial-fan deposits (QTaf) beneath a thin cover of Lake Bonneville sediments, and some contain excellent exposures of the underlying Jordan Narrows unit of the Miocene to Pliocene Salt Lake Formation.

Qft — **Tailings** (historical) – A large active tailings pond containing the waste from washed or milled ore from Kennecott operations occupies the northwest corner of the Magna quadrangle; smaller ponds and disposal sites are mapped east of the large pond and north of State Route 201.

Colluvial deposits

Qc — **Colluvial deposits** (Holocene to upper Pleistocene) – Poorly to moderately sorted, angular, clay- to boulder-size, locally derived sediment deposited by rock fall, slopewash, and soil creep on moderate slopes near the mouth of Harkers Canyon; most bedrock is covered by at least a thin veneer of colluvium, and only the larger, thicker deposits are mapped; maximum thickness about 20 feet (6 m).

Lacustrine deposits

Deposits post-dating the Bonneville lake cycle (Curry and Oviatt, 1985):

Qlmy — **Lacustrine mud** (Holocene) – Poorly sorted clay, silt, and minor sand deposited in mud flats or playas exposed by fluctuations of Great Salt Lake; local accumulations of gypsum, halite, and other salts commonly form a thin crust on the ground surface; generally less than 10 feet (3 m) thick.

Qly — **Young lacustrine deposits** (Holocene) – Poorly sorted silt, clay, and minor sand deposited by Great Salt Lake after regression of Lake Bonneville from the Gilbert shoreline; grades into deposits of lacustrine silt and clay of Lake Bonneville that are not mapped separately because of similar sediment type and appearance; generally less than 15 feet (5 m) thick.

Qldy — **Young deltaic deposits** (Holocene) – Clay, silt, sand, and minor pebble gravel deposited in the ancestral Jordan River delta; typically not incised by post-Bonneville stream channels, as are young lacustrine deposits (Qly), and are characterized by a gently sloping, smooth ground surface; the ground surface underlain by this unit is displaced by the Granger fault, part of the active West Valley fault zone (Keaton and others, 1993), in the northeast corner of the Magna quadrangle; generally less than 10 feet (3 m) thick.

Regressive-phase deposits of the Bonneville lake cycle (Curry and Oviatt, 1985):

Qlgp — **Lacustrine gravel and sand related to the Provo (regressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Moderately to well-sorted, moderately to well-rounded, clast-supported, pebble to cobble gravel and pebbly sand deposited at and below the Provo shoreline; thin to thick bedded; typically interbedded with, or laterally gradational to, lacustrine sand and silt; gastropods locally common in sandy lenses; locally partly cemented with calcium carbonate; the most extensive deposits form beaches along the Provo shoreline and beaches and spits along the Gilbert shoreline; forms a cuspate barrier beach in the southeast corner of the Magna quadrangle, called a V-bar by Gilbert (1890), created by converging currents of Lake Bonneville along the Provo shoreline; Currey (1982) measured the altitude of the Provo shoreline on the V-bar at about 4826 feet (1471 m) and measured the altitude of the Gilbert shoreline at about 4252 feet (1296 m) on a spit in the northern part of the Magna quadrangle (table 1); as much as 25 feet (8 m) thick.

Qlsp — **Lacustrine sand and silt related to the Provo (regressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Fine- to coarse-grained lacustrine sand and silt with minor gravel; typically thick bedded and well sorted; gastropods locally common; forms barrier beaches along the Gilbert shoreline in the northeast part of the Magna quadrangle; as much as 10 feet (3 m) thick.

Transgressive-phase deposits of the Bonneville lake cycle (Curry and Oviatt, 1985):

Qlgb — **Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Moderately to well-sorted, moderately to well-rounded, clast-supported, pebble to cobble and rare boulder gravel and pebbly sand deposited between the Bonneville and Provo shorelines; thin to thick bedded; typically interbedded with, or laterally gradational to, lacustrine sand and silt; gastropods locally common in sandy lenses; locally partly cemented with calcium carbonate; forms a beach intermittently along the Bonneville shoreline near the base of the Oquirrh Mountains, small barrier beaches and spits on deltaic deposits east of Harkers Canyon, and more extensive deposits upslope from the Provo shoreline east of Harkers Canyon; the Bonneville beach is best developed on the southern edge of Little Valley west of Magna where Currey (1982) measured the altitude of the Bonneville shoreline at about 5217 feet (1590 m) (table 1); as much as 90 feet (30 m) thick at Little Valley, but typically less than 60 feet (20 m) thick elsewhere.

Qlsb — **Lacustrine sand and silt related to the Bonneville (transgressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Fine- to coarse-grained lacustrine sand and silt with minor gravel deposited between the Bonneville and Provo shorelines; grades downslope to finer grained Lake Bonneville deposits; typically thick bedded and well sorted; gastropods locally common; forms small deposits east of Harkers Canyon; poorly exposed but probably less than a few tens of feet thick.

Qldb — **Deltaic deposits related to the Bonneville (transgressive) phase of the Bonneville lake cycle** (upper Pleistocene) – Moderately to well-sorted, moderately to well-rounded, clast-supported, pebble and cobble gravel in a sand matrix; thin to thick bedded; locally partly cemented with calcium carbonate; mapped at the mouths of some abandoned drainages east of Harkers Canyon; commonly associated with small gravel barrier beaches at and slightly below the Bonneville shoreline; may include topset alluvium undifferentiated at the map scale; maximum thickness about 40 feet (12 m).

Undivided deposits of the Bonneville lake cycle (Curry and Oviatt, 1985):

Qlgbp — **Lacustrine gravel and sand of the Bonneville lake cycle, undivided** (upper Pleistocene) – Moderately to well-sorted, moderately to well-rounded, clast-supported, pebble to cobble gravel and pebbly sand; deposited at and below the Provo shoreline, where transgressive- and regressive-phase deposits cannot be differentiated and deposits cannot be directly correlated with regressive-phase shorelines; thin to thick bedded; typically interbedded with, or laterally gradational to, lacustrine sand and silt; locally partly cemented with calcium carbonate; may be as much as 75 feet (25 m) thick.

Qlsbp — **Lacustrine sand and silt of the Bonneville lake cycle, undivided** (upper Pleistocene) – Fine- to coarse-grained lacustrine sand and silt with minor gravel; deposited at and below the Provo shoreline, where transgressive- and regressive-phase deposits cannot be differentiated and deposits cannot be directly correlated with regressive-phase shorelines; grades downslope to finer grained Lake Bonneville deposits; typically thick bedded and well sorted; gastropods locally common; mapped in the central and southeastern parts of the Magna quadrangle; may be as much as 75 feet (25 m) thick.

Qlmbp — **Lacustrine silt and clay of the Bonneville lake cycle, undivided** (upper Pleistocene) – Calcareous silt, clay, and minor fine-grained sand deposited below the Provo shoreline where transgressive- and regressive-phase deposits cannot be differentiated and deposits cannot be directly correlated with regressive-phase shorelines; typically laminated or thin bedded; ostracodes locally common; grades upslope into lacustrine sand and silt; common in the northern part of the Magna quadrangle south of the Gilbert shoreline and also present in smaller areas in the southeast part of the quadrangle; may be as much as 75 feet (25 m) thick.

Qll — **Lagoon-fill deposits** (upper Pleistocene) – Silt and clay, with minor fine-grained sand and pebbles; the unit typically underlies level, grass-covered fields in closed depressions behind Lake Bonneville barrier beaches; three lagoon-fill deposits lie between the Bonneville and Provo shorelines and were formed during the transgressive phase of Lake Bonneville; two of the transgressive lagoon-fill deposits are near the mouth of Harkers Canyon and the third lies about 1 mile (1.6 km) to the south; a regressive lagoon-fill deposit lies between barrier beaches at and near the Gilbert shoreline near Magna; maximum thickness about 20 feet (6 m).

Mass-movement deposits

Qmsy — **Younger landslide deposits** (historical to upper Pleistocene) – Very poorly sorted, clay- to boulder-size, locally derived material deposited by rotational and translational movement; characterized by moderately subdued landslide features suggesting an early Holocene or late Pleistocene age, but some landslides may have historical movement; most younger landslides are on the northwest side of Harkers Canyon where surfaces of rupture in the tuffaceous Jordan Narrows unit of the Miocene to Pliocene Salt Lake Formation undermined middle Pleistocene to upper Miocene[?] alluvial-fan deposits (QTaf) along steep canyon walls, resulting in several cuspate main scarps and earth flows; other landslides in similar material southeast of Harkers Canyon are along the steep scarp of the Bonneville shoreline, and a landslide on the south side of Little Valley resulted from failure of slopes underlain by Lake Bonneville deposits; variable thicknesses as much as several tens of feet.

Qmt — **Talus deposits** (Holocene to upper Pleistocene) – Very poorly sorted, angular cobbles and boulders and finer-grained interstitial sediment deposited principally by rock fall on and at the base of steep slopes; mapped on the south side of Little Valley where quartzitic rock-fall debris from the Permian and Pennsylvanian Kessler Canyon Formation rests on the Bonneville shoreline bench; generally less than 20 feet (6 m) thick.

Mixed-environment deposits

Qac — **Alluvial and colluvial deposits** (Holocene to upper Pleistocene) – Poorly to moderately sorted, generally poorly stratified, clay- to boulder-size, locally derived sediment deposited in swales and small drainages by fluvial, slopewash, and creep processes; a single exposure is mapped near the southwest corner of the quadrangle; less than 30 feet (9 m) thick.

Qlay — **Young lacustrine and alluvial deposits** (Holocene) – Silt, clay, and minor sand deposited by streams draining the Great Salt Lake flood plain, and in shallow lakes, ponds, and marshes associated with the streams; mapped in areas of standing water or where the lake level has recently been at the ground surface; commonly organic rich; less than 10 feet (3 m) thick.

Stacked-unit deposits

Qlgb/Qafo — **Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle over older alluvial-fan deposits** (upper Pleistocene/upper to middle Pleistocene) – Older alluvial-fan deposits partly concealed by a discontinuous veneer of sediment reworked by Lake Bonneville wave action; closely spaced, well-preserved shorelines are common on the steeper, upper parts of fans, but are less well developed lower on the fans where lacustrine deposits are finer grained and thicker; mapped on piedmont slopes at the base of the Oquirrh Mountains between Little Valley and Harkers Canyon; lacustrine deposits are generally less than 10 feet (3 m) thick.

Qlgb/QTaf — **Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle over oldest alluvial-fan deposits** (upper Pleistocene/middle Pleistocene to upper Miocene [?]) – Oldest alluvial-fan deposits partly concealed by a discontinuous veneer of sediment reworked by Lake Bonneville wave action; closely spaced, well-preserved shorelines are common; mapped on piedmont slopes at the base of the Oquirrh Mountains south of Harkers Canyon, where irregular landscape below the Bonneville shoreline reflects buried topography of fan deposits; lacustrine deposits are generally less than 10 feet (3 m) thick.

Qlgb/Ppc — **Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle over the Park City Formation** (upper Pleistocene/Upper to Lower Permian) – Park City Formation partly concealed by a discontinuous veneer of sediment eroded and reworked by Lake Bonneville wave action; characterized by lag of subangular limestone boulders from the Park City Formation; mapped on steep slopes near the base of the Oquirrh Mountains north of Little Valley; lacustrine deposits are generally less than 10 feet (3 m) thick.

Qlgb/PPok — **Lacustrine gravel and sand related to the Bonneville (transgressive) phase of the Bonneville lake cycle over the Kessler Canyon Formation** (upper Pleistocene/Lower Permian to Upper Pennsylvanian) – Kessler Canyon Formation partly concealed by a discontinuous veneer of sediment eroded and reworked by Lake Bonneville wave action; characterized by lag of subangular quartzite boulders from the Kessler Canyon Formation; mapped on steep slopes at the base of the Oquirrh Mountains south of Little Valley; lacustrine deposits are generally less than 10 feet (3 m) thick.

unconformity

QUATERNARY-TERTIARY

QTaf — **Oldest alluvial-fan deposits** (middle Pleistocene to upper Miocene[?]) – Poorly to moderately well-sorted, weakly to non-stratified sand, silt, and pebble to boulder gravel deposited principally by debris flows; thin to thick beds of white to light gray tuff and tuffaceous sediments near the base of the unit indicate a gradational contact with the underlying Jordan Narrows unit of the Miocene to Pliocene Salt Lake Formation (Tsl); glass-shard analyses of tuff samples from the adjacent Copperton quadrangle (Biek and others, 2006) suggest a chemical correlation to the 6.4±0.1 Ma Walcott Tuff, indicating a late Miocene(?) age for the lower part of QTaf; a middle Pleistocene age for the youngest part of the unit is suggested by development of a stage IV calcic paleosol on fan surfaces, characterized by an indurated matrix cemented with laminated calcium carbonate; mapped by Slentz (1955) as part of the Pliocene and Pleistocene Harkers Fanglomerate unit of the Salt Lake Group, including all pre-Bonneville alluvial-fan deposits, which was redefined by Tooker and Roberts (1971b) as the Pleistocene Harkers Alluvium; the terms Harkers Fanglomerate and Harkers Alluvium are not used here because the lower part of the pre-Bonneville alluvial-fan deposits may be as old as late Miocene and the deposits can be subdivided into older alluvial-fan deposits (Qafo) and oldest alluvial-fan deposits (QTaf); extensive, erosionally resistant fan remnants form steep, deeply dissected foothills in the Oquirrh Mountains south of Coon Canyon, and isolated remnants are found north of the canyon; in the southwest corner of the quadrangle, the unit is separated from the Lower Permian to Upper Pennsylvanian Kessler Canyon Formation (PPok) by the Harkers fault, a range-front normal fault with an indeterminate amount of movement of at least several hundred feet down to the east and with most recent fault movement of at least Miocene age and possibly as young as middle Pleistocene; several small normal faults (mapped as a single fault because of their proximity to each other) with maximum displacement of at least 20 feet (6 m) are exposed in QTaf in a railroad cut southeast of Coon Canyon, but cannot be traced into the overlying upper Pleistocene Lake Bonneville gravel; exposed thickness as much as 350 feet (100 m).

TERTIARY

Salt Lake Formation (Pliocene to Miocene)

Tsl — **Jordan Narrows unit** – White to light-gray tuffaceous marlstone and micrite, lesser claystone, sandstone, and rhyolitic tuff, and minor limestone that is locally cherty or oolitic; part of the Jordan Narrows unit of Slentz (1955); poorly and incompletely exposed, but locally well exposed along road cuts and in sand and gravel pits; upper contact with middle Pleistocene to upper Miocene[?] alluvial-fan deposits (QTaf) is gradational, and we have restricted Salt Lake strata to non-conglomeratic beds; probably deposited principally in a lacustrine environment (see, for example, Slentz, 1955); Bryant and others (1989) reported a fission-track age of 4.4 ± 1.0 Ma for a rhyolitic tuff in the reclaimed Pioneer pit in the SW1/4 section 11, T. 2 S., R. 2 W.; the total thickness is unknown along the west side of Salt Lake Valley; exposed thickness probably 300 to 500 feet (90-150 m).

unconformity

TERTIARY and CRETACEOUS, undivided

TKc? — **Conglomerate** (Paleocene to Upper Cretaceous) – One small queried exposure is present about 1 mile (1.6 km) south of Magna, where pebble to cobble conglomerate with pebbly sandstone interbeds is poorly exposed on a slope covered by colluvium; clasts in the exposure are subangular to rounded, mostly subrounded, and consist of sandstone, quartzite sandstone, black chert, and rare limestone of Pennsylvanian-Permian affinity; about 30 feet (9 m) thick, but similar deposits are in excess of 400 feet (120 m) thick at Mahogany Hill immediately west of the Magna quadrangle (Tooker and Roberts, 1971a).

unconformity

PERMIAN

Rogers Canyon Sequence

Defined by Tooker and Roberts (1970) to include folded, upper plate strata of the North Oquirrh thrust. In the Magna quadrangle, the Rogers Canyon sequence includes the upper part of the Kessler Canyon Formation through the middle part of the Franson Member of the Park City Formation (Tooker and Roberts, 1971b).

Ppc — **Park City and Phosphoria Formations, undivided** (Upper to Lower Permian [Leonardian to Guadalupian]) – Regionally divisible into the lower Grandeur and upper Franson Members, which are separated by the Meade Peak Phosphatic Shale Tongue of the Phosphoria Formation, but undivided here due to structural complications and limited exposure. Still, parts of each member are recognizable in the Magna quadrangle where they are folded into a series of northeast-trending anticlines and synclines: **Grandeur** strata are thin- to thick-bedded, typically medium-bedded, light- to medium-gray limestone, cherty limestone, and sandy limestone, locally with thin lenses and irregularly shaped nodules of black chert; locally fossiliferous, especially basal beds, with common brachiopods, crinoid stems, gastropods, and bryozoans; **Meade Peak** strata weather to poorly exposed slopes; better exposures to the west in Coon Canyon reveal a lithologically diverse unit of typically thin-bedded and variably colored gray, yellowish brown, and locally reddish brown quartzite, dolomite, sandstone, shale, chert, and phosphorite (Tooker and Roberts, 1971a); **Franson** strata are thin- to thick-bedded, typically medium bedded, light- to medium-gray dolomitic limestone, dolomite, limestone, and calcareous sandstone; limestone locally contains brachiopods; upper contact not exposed, and to the west the member is unconformably overlain by Tertiary-Cretaceous conglomerate and Eocene volcanic rocks (Tooker and Roberts, 1971a); age from Gordon and Duncan (1970) and Wardlaw and Collinson (1979); Tooker and Roberts (1971a) measured 215 feet (65 m) of strata likely equivalent to the Grandeur Member, 284 feet (87 m) of strata likely equivalent to the Meade Peak Phosphatic Shale Tongue, and an incomplete section of 261 feet (80 m) of strata likely equivalent to the Franson Member, all in Coon Canyon west of the Magna quadrangle.

unconformity(?)

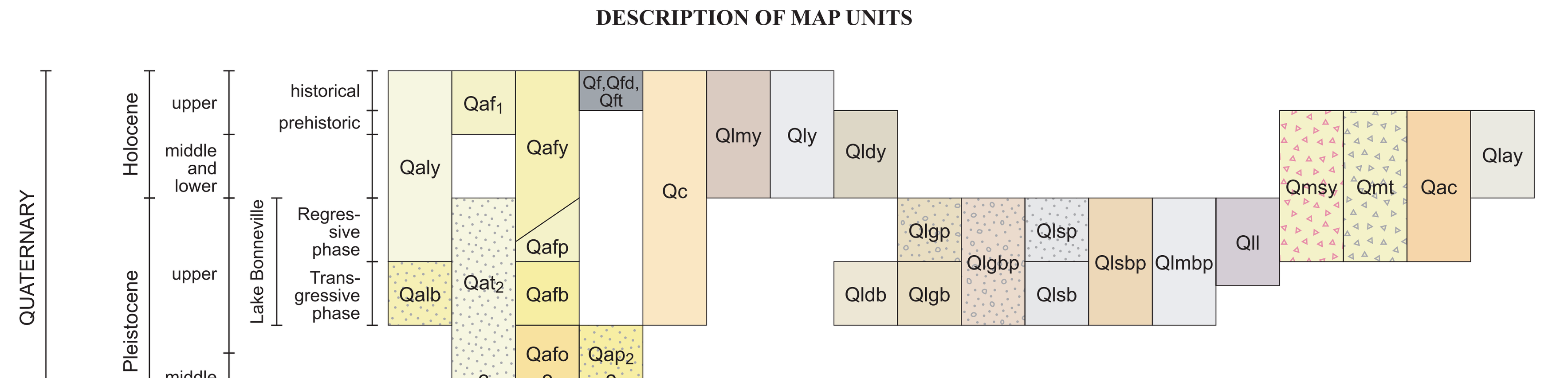
PERMIAN and PENNSYLVANIAN

PPpk — **Park City Formation and Kessler Canyon Formation, undivided** (Upper Permian to Upper Pennsylvanian) – Light- to medium-gray limestone and dolomitic limestone, yellowish-brown quartzite sandstone and calcareous and dolomitic sandstone, and minor light-gray dolomitic limestone sedimentary breccia; exposed in fault block north of Coon Canyon where it is undivided due to poor exposure.

Oquirrh Group

PPok — **Kessler Canyon Formation** (Lower Permian to Upper Pennsylvanian) – Thin- to medium-bedded, yellowish-brown quartzite sandstone and calcareous and dolomitic sandstone, and minor light-gray dolomitic limestone sedimentary breccia and yellowish-brown sandy limestone; some sandstone beds contain 0.2- to 0.6-inch- (0.5-1.5-cm-) diameter concretions that weather out to leave a pitted surface rimmed with iron-manganese oxides; forms steep, poorly exposed slopes north of Harkers Canyon where it is folded into a series of northeast-trending anticlines and synclines; also exposed as an isolated, possibly fault-bounded, block east of Utah Highway 111 in Magna (Tooker and Roberts, 1971b); upper contact corresponds to a change from yellowish-brown, thick-bedded quartzitic sandstone to light-gray to bluish-gray, medium-bedded fossiliferous limestone; poorly constrained age from Gordon and Duncan (1970); the lower part of the formation is not exposed in the Magna quadrangle, but Tooker and Roberts (1970) reported that the total thickness of the formation probably exceeds 4300 feet (1300 m) in the adjacent Farnsworth Peak (formerly Garfield) quadrangle.

DESCRIPTION OF MAP UNITS



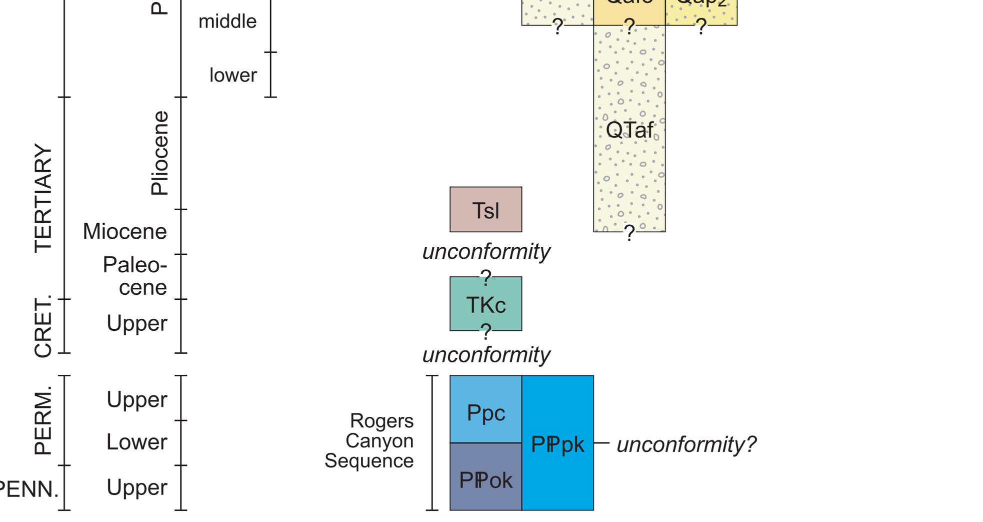


Table 1. Ages and elevations of major shorelines of Lake Bonneville and Great Salt Lake in the Magna quadrangle

Lake Cycle and Phase	Shoreline (map symbol)	Age* (calendar years B.P.)	Elevation (feet/meters)
Lake Bonneville			
Transgressive Phase	Stansbury (S)	24,400-23,200	4,470-4,485 (1,360-1,365)
	Bonneville (B)	18,000-16,800	5,185-5,220 (1,580-1,590)
	Flood		
Regressive Phase	Provo (P)	16,800-13,500	4,820-4,835 (1,470-1,475)
	Gilbert (G)	12,800-11,600	4,245-4,260 (1,295-1,300)
Great Salt Lake			
	Holocene highstand (H)	3,400	4,217-4,221 (1,285-1,287)

*All calendar-calibrated ages are from D.R. Currey, University of Utah (written communication to Utah Geological Survey, 1996) except for the age of end of the Provo shoreline. Godsey and others (2005) revised the timing of the occupation of the Provo shoreline and subsequent regression. Calendar-calibrated ages are derived from radiocarbon ages. Oviatt and Thompson (2002) summarized many recent changes in the interpretation of the Lake Bonneville radiocarbon chronology. The most recent radiocarbon chronology in the summary is from Oviatt (1997), which modifies data published by Oviatt and others (1992).

GEOLOGIC SYMBOLS

Contact – Dashed where approximately located

Normal fault – Dashed where approximately located, dotted where concealed and approximately located; bar and ball on down-dropped side

Thrust fault – Dashed where approximately located, queried where uncertain; teeth on upper plate

Axial trace of anticline – Dashed where approximately located, dotted where concealed and approximately located; arrow shows direction of plunge

Axial trace of syncline-- Dashed where approximately located, dotted where concealed and approximately located; arrow shows direction of plunge

Axial trace of overturned syncline – Dashed where approximately located, dotted where concealed and approximately located; arrow shows direction of plunge

Shorelines of the Bonneville lake cycle. Mapped at the top of the wave-cut platform; may coincide with geologic contacts –

S
Stansbury shoreline

B
Highest shoreline of the Bonneville (transgressive) phase

P
Highest shoreline of the Provo (regressive) phase

P
Other shorelines of the Provo phase

G
Gilbert shoreline

H
Holocene highstand shoreline of Great Salt Lake

5195
Elevation (in feet) of selected Lake Bonneville shoreline features; elevation determined photogrammetrically

Crest of Lake Bonneville barrier beach or spit

Landslide scarp – Hachures on down-dropped side

34 35
Strike and dip of inclined bedding – Red symbols indicate attitudes from Tooker and Roberts (1971a)

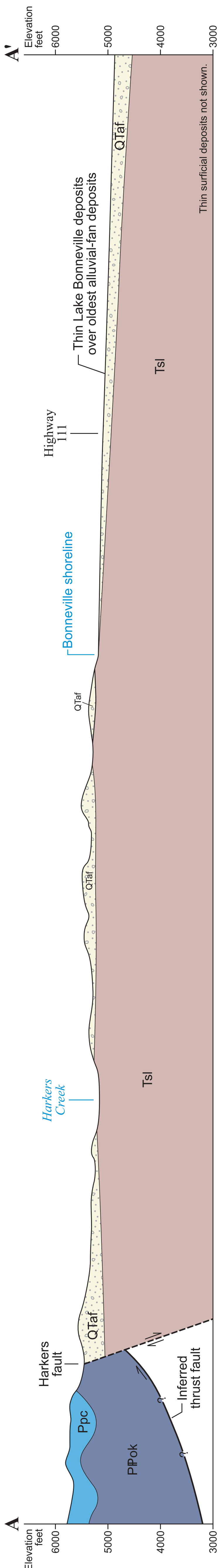
80
Strike and dip of overturned bedding

30
Approximate strike and dip of inclined bedding

Strike of vertical bedding

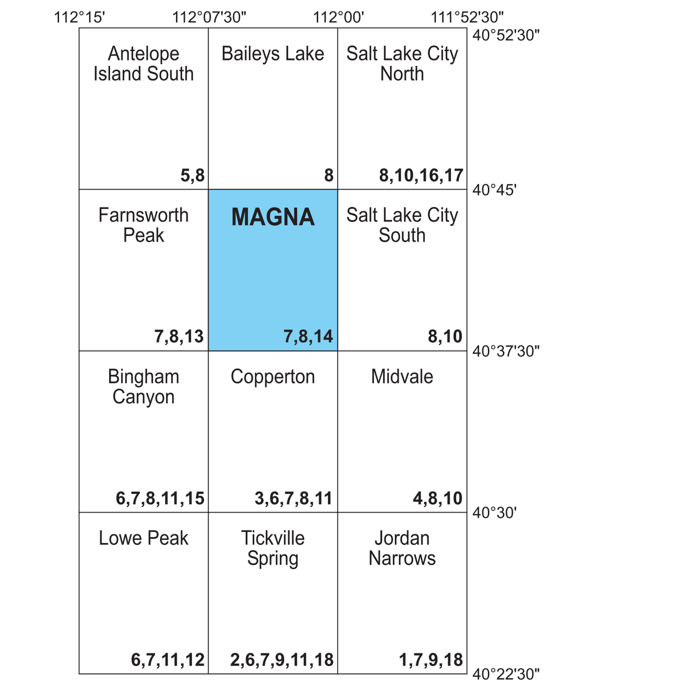
Sand and gravel pit

Spring



LITHOLOGIC COLUMN

SYSTEM	SERIES AND STAGE		FORMATION		SYMBOL		THICKNESS Feet (Meters)	LITHOLOGY
QUAT.	Pleistocene and Pliocene		Oldest alluvial-fan deposits		QTaf		350 (100)	Gradational contact
TERTIARY	Pliocene and Miocene		Salt Lake Formation		Tsl		300-500 (90-150)	Rhyolite tuffs
TERTIARY	Paleocene		Conglomerate		TKc?		30 (9)	
CRET.	Upper							
ROGERS CANYON SEQUENCE								
PERMIAN	Upper	Leonardian and Guadalupian	Park City Formation and Phosphoria Formation		Ppc	PPpk	760 (230)	Not exposed
PERMIAN	Lower	Wolf.						Unconformity?
PENNSYLVANIAN	Upper	Missourian(?) and Virgilian	Oquirrh Group	Kessler Canyon Formation	PPok		>4300 (>1300)	Not exposed



Index map of USGS 7.5' quadrangles showing selected geologic maps available for the Magna and other nearby quadrangles.

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